2.7　Tarzan

Reading: Properties of operations

1. You are in a checkout line, and when you get to the front, you find that your cashier is a friendly man in a loincloth. He seems to be bent on being as helpful as can be, but talks as if he had been raised in the jungle. He has been taught to run the register, but appears to have the mathematical sophistication of a small child. Some of his statements crack you up because the math they lack is so ingrained in you. Try to figure out which mathematical properties of addition prevent normal cashiers from making the following statements.

   (a) I'm sorry, I can't sell you both of those items together. Although the individual price of each is OK, there's no knowing whether the total will be a whole number of cents.

   (b) This box has nothing in it, but when I ring it up, your total may change.

   (c) Would you like me to ring up your ice cream before or after your cake? The order could make a big difference in the total, you know.

   (d) Do you want me to ring up subtotals so you can keep track of what you're spending? Well, the way I choose to group the items in subtotals will affect your total cost.

2. What property of addition is Tarzan using when he comes up with an inspired method for calculating $8 + 5$, saying "$8 + 2$ is 10, plus 3 more makes 13"?

3. (a) Is the set of natural numbers with the number 5 removed closed under addition?

   (b) Is the set of natural numbers with the number 0 removed closed under addition?

   (c) Are the even numbers closed under addition? The odd numbers? The perfect squares?

   (d) Find the smallest set containing the number 3 that is closed under addition.

   (e) Find the smallest set containing the number 1 that is closed under addition.

   (f) Find the smallest set containing the number 0 that is closed under addition.

   (g) Repeat the last three problems, but with subtraction instead of addition.